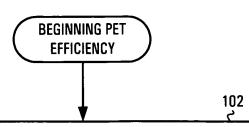
FIG. 1



IMPLEMENT A SPECIAL MASSIVELY PARALLEL-PROCESSING SYSTEM ARCHITECTURE WITH DIGITAL SIGNAL PROCESSING ON EACH ELECTRONIC CHANNEL, CAPABILITY OF FULLY PROCESSING ALL DATA CAPTURED (NO ELECTRONIC SYSTEM DEAD TIME), WITHOUT SATURATING THE ELECTRONIC SYSTEM AND HAVING DATA EXCHANGE CAPABILITY BETWEEN NEIGHBORING PROCESSORS, THE ARCHITECTURE ALLOWS FOR THE DETECTION OF MORE PHOTONS MORE ACCURATELY AND FOR THE IMPLEMENTATION OF A SIMPLIFIED, MORE EFFICIENT COINCIDENCE DETECTION CIRCUIT

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IMPLEMENT MODIFIED AND/OR SIMPLIFIED DETECTOR ASSEMBLY DESIGN FOR ELIMINATING BOUNDARIES

BETWEEN DETECTOR ELEMENTS (AND BETWEEN ELECTRONIC CHANNELS), WHICH IS ENABLED BY THE

PARALLEL-PROCESSING ARCHITECTURE

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IMPLEMENT COMPLEX REAL-TIME ALGORITHMS WHICH ALLOW THE DETECTION OF MORE PHOTONS MORE ACCURATELY, WHICH ARE ENABLED BY THE PARALLEL-PROCESSING ARCHITECTURE AND THE IMPROVED AND SIMPLIFIED DETECTOR ASSEMBLY

108

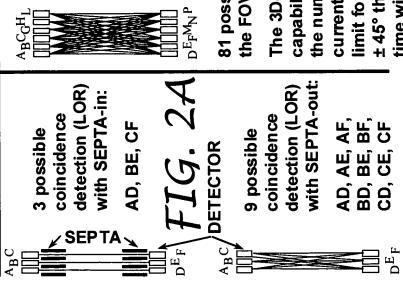
INCREASE THE FIELD OF VIEW (FOV) AND/OR LENGTH OF THE DETECTOR IN A COST-EFFECTIVE MANNER (PERMITTING TO USE ALSO ECONOMICAL CRYSTALS), WHICH ARE ENABLED BY THE PARALLEL-PROCESSING ARCHITECTURE AND THE IMPROVED AND SIMPLIFIED DETECTOR ASSEMBLY

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INCREASE THE SOLID ANGLE, BY INCREASING THE FOV, WHICH IN TURNS IT ALLOWS TO CAPTURE MORE PHOTONS WITHIN THE FOV

ENDING PET EFFICIENCY

PRIOR ART PET with SHORT FOV



INCREASING THE FOV

36 possible coincidence detection (LOR) when DOUBLING the FOV:

AD, AE, AF, BD, BE, BF, CD, CE, CF, GM, GN, GP, HM, HN, HP, LM, LN, LP, AM, AN, AP, BM, BN, BP, CM, CN, CP, GD, GE, GF, HD, HE, HF, LD, LE, LF.

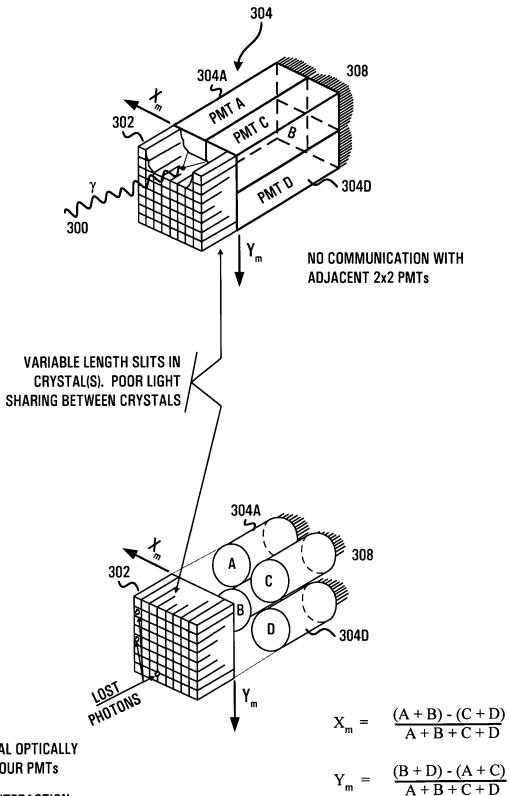
FIG. 2C

81 possible coincidence detection (LOR) when the FOV is three times in length.

The 3D-CBS, with over 1 meter FOV, has the capability to capture in 3-D hundreds of times the number of LORs that can capture the current PET when is used in 2-D mode. The limit for each location of the body is about ± 45° the angle with a ring (or TOF₁ - TOF₂ < time window)

FIG. 2D

FIG. 2B



SMALL CRYSTAL OPTICALLY COUPLED TO FOUR PMTs

CRYSTAL OF INTERACTION
DETERMINED BY LIGHT
SHARING BETWEEN 2X2 PMTs

FIG. 3A

PRIOR ART

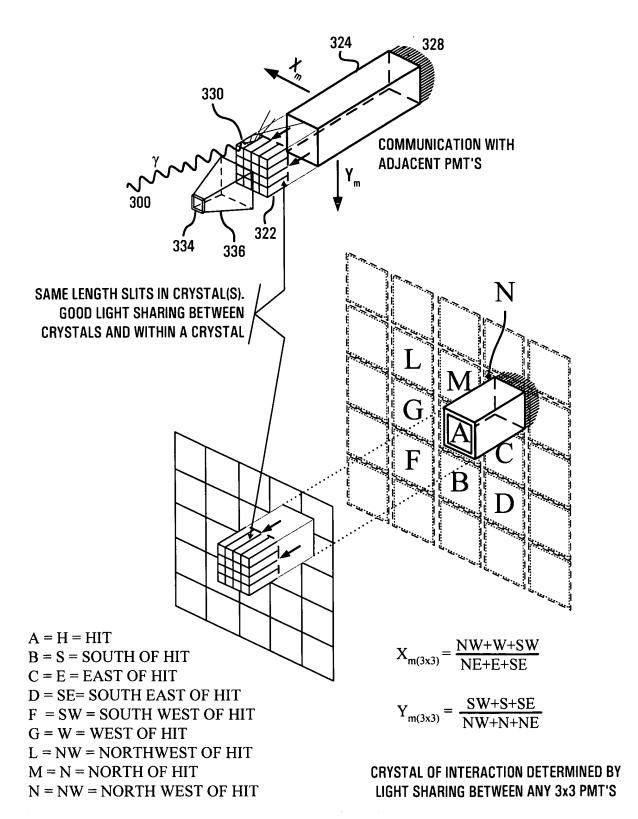
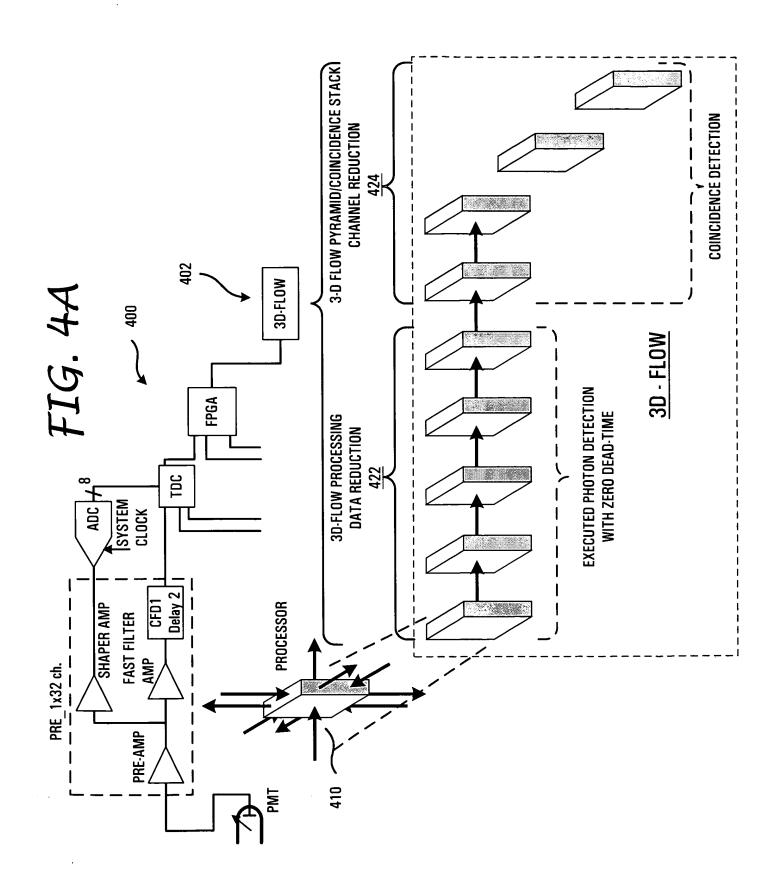
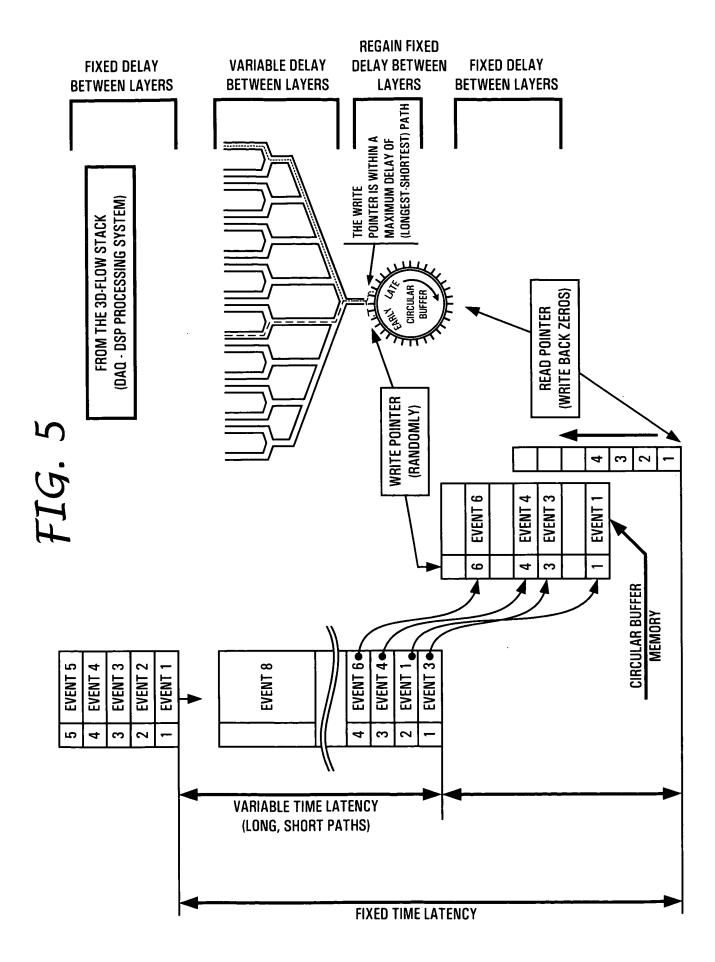


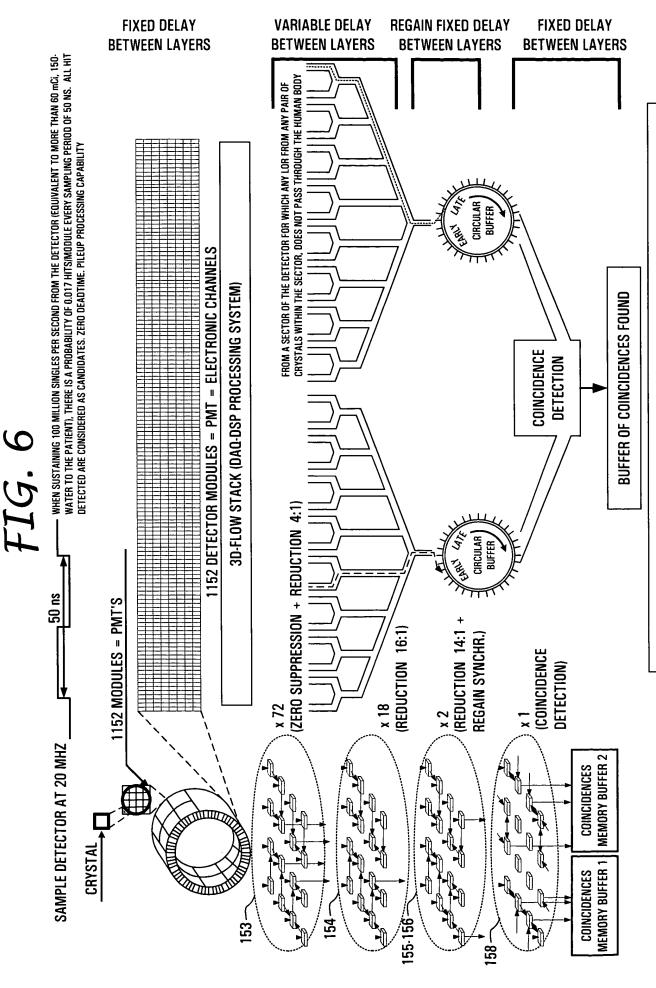
FIG. 3B



A1 B1 C1 D1 A2 B2 C2 D2 A3 B3 TASK C3 TASK B3 A1 B1 C1 D1 A2 B2 C2 D2 A3 B3 C3 D3 TASK A3 TASK D2 **EAST** BOTTOM TASK C2 FIG. 4B TASK B2 TASK A2 SOUTH NORTH TASK D1 TASK C1 TASK B1 TASK A1 **T0P** 410 WEST IN-DATA LAYER A LAYER B LAYER C LAYER D **OUT-RESULTS** FIG. 4C LAYERD

FIG. 4D





COMPARISONS WERE EXECUTED), ONLY THE CANDIDATES FOR A COINCIDENCE ARE COMPARED (6 COMPARISONS). NOT ALL LOR ARE CHECKED EVERY SAMPLE PERIOD AS IT WAS IN PREVIOUS PET DESIGNS (WHEN ABOUT 700

